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IJFBS
Finance & Banking Studies

Finance & Banking Studies

IJFBS, VOL 10 NO 2 ISSN: 2147-4486
Contents available at *www.ssbfnet.com/ojs*

https://doi.org/10.20525/ijfbs.v10i2.1236

What Drives Bank Profitability? A Panel Data Analysis of Commercial Banks in Bangladesh

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Abstract

Bank profitability plays a significant role in the growth and development of an emerging economy. The purpose of the study was to examine the impact of bank characteristics, industry concentration and macroeconomics variables on commercial bank profitability in Bangladesh from 2007-2017. Bank profitability is proxied by return on assets (ROA), return on equity (ROE) and net interest margin (NIM). The study is based on secondary data and Hausman test has been performed using STATA software in favor of fixed effect modeling. Panel regressions shows that cost efficiency has significant negative impact on ROA and NIM. The positive impact of loan to deposit ratio with ROA suggests that efficient fund management including investment and assessed expenditure should be emphasized. Bank size has significant negative impact on all the measures of profitability, which indicates that monopolistic competition will reduce banking profit. Credit risk has significant positive impacts on ROE. Industry concentration measured by CR3 is positively related with ROE and has significant negative relation with bank profitability (ROA). Among macroeconomic variables inflation has significant positive and bank spread has significant negative impact on ROE. The coefficients of all the macroeconomic variables have been found to be significantly related to bank profitability while measured by NIM. Our study recommends further research with other explanatory variables such as, corporate governance, corporate social responsibility (CSR) and deposit insurance to accelerate the model and construct the econometric model by using structural equation modeling, mediation effect modeling etc.

Keywords: *Profitability; Cost efficiency; Capital adequacy; Bank spread; Commercial bank*

JEL Classifications: *C23; G21*

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Introduction

As an essential institutional and serviceable unit, the improved banking system plays a significant role for the transformation of the economy. But, for the developing countries banking sector is less stable compared to the developed countries (Sufian & Habibulla, 2009a). In Bangladesh some of the banks are being stopped working like 'Farmer's bank' for insolvency and fraudulent activities and the newly permitted banks are not good performing, non-performing loan is increasing day by day and profitability is not achieved as expected. There also exist a debate of one digit interest rate These factors make Bangladesh a unique setting for investigating the impact of internal matters as well as external matters on bank profitability.

Profitability is the capacity of a business to earn profit. Determining the present and past profitability and projecting upcoming profitability is very vital for any business sector. A sound banking sector provides a base for stabilizing financial system to accomplish earnings for developing economy. Some commercial banks are renowned for their profitability but some other banks are not performing well, this poses questions about some factors which will be dominated by the bank management to determine their profitability. In line with this dispute, we are trying to identify the extent of common determinants which drive bank profitability in the context of Bangladesh.

A steadfast and competent banking system is able to provide substantial profit, can offer excellent quality of facility to the clients and can accumulate adequate fund to give loan to borrowers. In micro level, banks try to earn enough profit to acquire a place in times of increasing competition in the economy. At macro level, sufficient profit is required to absorb any undesirable shocks and to remain stable in the financial system. Basel Committee on Bank Supervision (BCBS, 2006) indicates that operational risk of any bank lead to failure in internal process, people and system management. However, skillful behavior and sustainable performance are the considerable factors for reaping competitive advantage of today's organizations. In the banking industry of Bangladesh, bank characteristics resembling inefficient cost management, liquidity position, size of the bank, management of overhead expenses, capital adequacy, non-performing loan status, intermediation role of banks, and macroeconomic variables like, inflation and economic growth may have effect on bank profitability.

This paper strives to identify impactful bank-specific factors and macroeconomic issues to boost up profitability of the banks and also contribute academia through adding empirical evidences from the commercial banks of Bangladesh.

The banking system of Bangladesh is a combination of private, public, foreign, specialized and cooperative banks. New banks are now relentlessly fighting for their survival in the competitive market. The business activities of the private commercial banks (PCBs) increased in a considerable number and have occupied a lion share in the bank business, revealed in assets growth, deposits mobilization and credit disbursement. Consequently, profitability declined gradually during the last several years. This makes sense to analyze the factors to be responsible to determine bank profitability. Hence, it is also imperative to examine the significant issues which affect bank profitability in Bangladesh, as this would enable the future researchers to identify the responsible factors for the deviation of bank performance.

Literature Review

Profitability is a symbol to demonstrate the performance of the financial system of banking sector as well as the economy of a country as a whole. Numerous investigators from different nations have explored the influence of bank-specific and macroeconomic issues on bank profitability. Weerasainghe and Perera (2013) accomplished a research in Sri Lanka, where they showed that profit of the banking sector is enhanced by a favorable macroeconomic environment. Dietrich and Wanzenried (2011) performed a study on 372 commercial banks in Switzerland during 1999 to 2009 in which they took into account both in pre-crisis and post-crisis period of 1999-2006 and 2007-2009 respectively. They took averages of ROE, ROA and NIM of the banks as profitability measure. In their study, they showed that highly skilled banks can produce more profit than less competent one; loan growth and diversification affect positively on profitability and funding cost affect negatively to generate profit. Hosen (2020) performed a study in Bangladesh on 23 commercial banks and found that banks' specific factors like interest rate spread, capital adequacy ratio, credit risk, deposit growth, loan to deposit ratio, cost to income ratio and size of the bank significantly affect profitability of banks measured in terms of ROA and ROE. Flamini et al. (2009) and Athanasoglou et al. (2006) employed bank specific factors like operating expenses, asset quality, management efficiency, bank size, capital

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adequacy and liquidity as internal factors and GDP, inflation, money supply and interest rate as external factors in their studies. They claimed that internal factors can be regulated by the management of the banks and changes of these factors may create business risk. Again, external factors cannot be controlled by the bank management and create systematic risk. Both types of risks have a strong influence on the profitability of bank.

Edwards (1977), revealed that banks with large number of employees, greater expenditure on wages enjoy monopoly power to generate profit. He argued that expense-preference model is a valuable framework than profit maximization model to make profit. According to Williamson (1963), Rees (1974) and Becker (1957), managers may increase staff expenditure; managerial remunerations and discretionary income which have a helpful impact on profitability. They also observed that 'expense-preference theory' received a substantial attention to maximize the utility of the firm by pursuing non-profit maximizing policies which will engender profit in the long run. Alper and Anbar (2011) conducted a study with 10 listed commercial banks in Turkey for a period of 2002 to 2010 by considering some bank-specific variables and macroeconomic variables. They showed that asset size of the bank influenced positively on ROE and non-interest income to total asset ratio affect negatively on ROA.

Rahaman and Akhter (2015) accomplished a study in Bangladesh for a period of 2009 to 2013 with some selected bank specific variables on Islamic bank profitability. They revealed that size and deposits of the bank have substantial negative influence on ROA. Abdullahi and Usman (2017) furnished a study in Nigeria where they found that equity to total asset ratio and credit risk management have a significant effect on the efficacy of the bank which was determined in terms of ROA and ROE. White (1976) performed a study by using profit-maximizing, non-price competition model and found that banks incur higher cost in more competitive atmosphere than other banks which exists in less competitive environment. Sufian and Habibullah (2009b) performed a study regarding the profitability of banks in China for a period of 2000 to 2005 by considering joint stock commercial banks, state owned commercial banks and city commercial banks. The researchers found that liquidity, capitalization and credit risk influence positively to accelerate the profitability of state-owned commercial banks. Cost influenced negatively on profitability of joint stock commercial banks and city commercial banks. In case of macroeconomic variables diversification and economic growth affect positively and money supply growth affect negatively on the profitability of state owned and city commercial banks in China.

Sufian (2011) investigated the impact of bank specific factors and macroeconomic factors on the profitability of Korean banks considering the period of 1992 to 2003. He performed regression analysis to identify the significant variables that have a great effect on bank profitability. He found that liquidity, credit risk and inflation had negative influence on profitability whereas diversification and size of the bank had positive effect on the profitability of Korean banks. Athanasoglou et al. (2006) examined that except liquidity other bank-specific factors considerably affect bank profitability. At the same time, they also found that concentration in the banking industry positively affect profitability of banks. Staikouras and Wood (2004) performed a research on European banks during the period of 1994 to 1998 by applying OLS technique and fixed effect model. They found that the interest rate impacts positively on profitability and GDP whereas growth rate had a significant negative relationship with profitability (ROA). Goddard et al. (2004) conducted a study by applying cross sectional regression analysis on 583 banks in Europe and found that GDP has a significant positive influence on profitability. Demirguc-Kunt and Detragiache (1998), accomplished a study on bank profitability considering 45 to 65 countries for a period of 1980 to1994 by using multivariate logit model. From their research outcome it is revealed that external factors are substantially responsible for the banking sector failure which in turn reduce profit earning capacity of banks. Naceur and Goaied (2008) established that bank with large volume of capital and overhead costs are positively correlated with net interest margin (NIM). But the size of the bank is negatively correlated with NIM. Zeitun (2012) considered ownership, bank-specific and macroeconomic variables to perform a research on some banks in Gulf Cooperation Council (GCC) during 2002 to 2009. He exhibited that bank equity and GDP affect positively on conventional bank profitability. However, cost to income ratio and inflation affect negatively on Islamic and conventional bank performances.

Ramadan et al. (2011) investigated the association between profitability and bank-specific factors of Jordanian banks. They found that well capitalized, low credit risk and efficient cost management tend to accelerate the profitability of banks but size of the bank is not a contributing factor to increase profitability. Waqas et al. (2014) performed a study in Pakistan and found that there is an opposite relationship between bank profitability and inflation. They observed that increase in inflation enhances the cost of service in the

form of fee and motivates its client to be unbanked which eventually leads to a reduction in profit. Kosmidou et al. (2005) conducted a research with 132 banks in United Kingdom (UK) for a period of 1998 to 2002 with an unbalanced panel data. They showed a strong positive influence of inflation, interest rate and GDP on banks' profitability. By performing a study in Kenya, Kiganda (2014) recommended that macroeconomic issues, like GDP, inflation and exchange rate have no significant impact on bank profitability. Scott and Arias (2011) carried out a study with the largest five banks in USA and found that GDP growth rate directly affects profitability of banks. Even though extensive researches have been performed regarding the determining factors of bank profitability in different nations, inclusive empiric evidence from developing countries is still vague or varied evidence (Almaqtari et al., 2019). Researchers tried to realize the impact of bank-specific issues and macroeconomic aspects on bank profitability outcomes of such studies are not persistent with harmony. Therefore, the present study tries to fill up this gap.

Methodology

This research is predominantly based on secondary data set because of the nature of the research. To inspect the influence of bank-specific variables, banking industry concentration and macroeconomic variables on bank profitability, a panel regression model was constructed. This analysis is carried out by considering the bank level annual data of 57 commercial banks functioning in Bangladesh for a period of 2007 to 2017. In our study, profitability is proxied by return on equity (ROE), return on assets (ROA), and net interest margin (NIM) as dependent variable accompanied by the set of bank-specific, industry concentration and macroeconomic factors as independent variables. For panel data analysis, Pooled Ordinary Least Square (POLS), Fixed Effect (FE) model and Random Effect (RE) model are generally used. Fixed effect estimator was developed by Gangle (2010) which is used to estimate the causal inference of firm characteristics and macro variable factors on bank profitability. We performed Hausman test to settle the best model for equation 1 to confirm the evidence in favor of a fixed effect modelling[1]

Model specification

The econometric approach to estimate the model will be as in the following linear form:

$\pi_{its} = a_0 + \sum_{j=0}^{j} \beta_j \ X^j{}_{it} + \sum_{l=0}^{l} \beta_l \ X^l{}_{it} + . \sum_{m=0}^{m} \beta_m \ X^m{}_{it} + \varepsilon_{it}$ --------Equation -1

Where, $\varepsilon_{its} = v_i + \mu_{its}$

"Here, π_{its} is the profitability of bank i at time t and assessed at parameter s (Where s = ROAit, ROEit and NIMit) along with i = 1,2,3….N; t=1,2,3…T and α is a constant term. The superscripts of j, l and m of Xit represent the descriptive variables (grouped into bank-specific, industry-specific and macroeconomic determinants respectively) and ε_{it} is the disturbance with υi capturing the unobserved bank-specific effect and μits the idiosyncratic error."

Determinants of bank profitability

We estimated the above econometric model regarding the determinants of bank profitability using 3 types of proxy variables that include i) bank- specific variables, ii) an industry- specific variable and iii) macroeconomic variables (Table 1).

We used return on asset (ROA), return on equity (ROE) and net interest margin (NIM) as the profitability indicators of banks in Bangladesh. ROA represents the extent of profitability of a company to its assets depending on the effectual utilization of its asset to engender earnings. ROE embodies the measure of profitability of an organization in relation to its stockholders' equity. NIM measures the interest earning spread of a company on its investing activities as a percentage of total interest earning assets. We tried to find out the significant influence of bank-specific, industry-specific and macroeconomic variables on these three profitability indicators.

[1] The appurtenant Hausman test chi-squared statistics is χ^2 (13) = 145.43 with p-value of 0.0000

Table 1: Descriptions of variables

Variables	Notation	Description	Expected Effect
Dependent variables to measure profitability:			
Return on Asset	ROA	Net Profit to total assets ratio	
Return on Equity	ROE	Net Profit to Shareholders Equity ratio	
Net Interest Margin	NIM	Net interest income to interest earning assets ratio	
Independent Variables			
Bank-Specific Variables			
i. Cost Efficiency	TE/TR	Total expense to total revenue ratio	-
ii. Liquidity position	LA/TA	Liquid asset to total asset ratio	-
iii. Credit Risk	TL/TA	Total loan to total asset ratio	-
iv. Capital Adequacy ratio	TE/TA	Total equity to total asset ratio	+
v. Bank Size	In (TA)	Natural logarithm of total asset of a bank	+/-
vi. Operating expense to total revenue ratio	OE/TR	Operating expense over total revenue (%)	-
vii. Non-performing loan to total loan ratio	NPL/TL	Non-performing loan over total loan (%)	-
viii. Overhead cost to Total asset ratio	OH/TA	Overhead cost over total asset (%)	-
ix Total loan to total deposit ratio	TL/TD	Total loan over total deposit (%)	-
Industry- Specific Variable			
x. Concentration ratio	CR3	Sum of total asset of largest three banks over that of the industry.	+/-
Macroeconomic variables			
xi. GDP growth rate	(% GDP)	Real GDP growth rate (%)	-
xii. Inflation rate	(%Inf)	Annual Rate of Inflation (%)	+
xiii. Bank Spread	SR	Difference between average lending rate and deposit rate of all commercial banks	+

Among bank-specific variables we used cost efficiency to measure the efficient expense management for doing banking operations which in turn enhance profit of the bank (Edwards & Heggestad, 1973). Liquidity Position is used to itigate its service debt and short-term liabilities. Usually, higher liquidity ratio lessens liquidity risk however there is a tradeoff between liquidity and profitability. As loanable fund will be condensed by upholding higher liquidity, banks' earning potential will be reduced. Thus, we expect inverse relationship between liquidity and profitability. As the underlying business of the bank is lending money, so we use the variable credit risk to capture the risk of financial distress by reducing quality of assets and increasing loan losses which eventually reduces bank profitability. We predict negative correlation between credit risk and bank profitability. Capital adequacy ratio governs the capital strength of the bank. Both positive (Ebenezer et al., 2017) and negative (Swarnapali, 2014) relationship was observed in different study. As this ratio ensures the financial stability by reducing the risk of insolvency, bank with high capital adequacy ratio is treated as safe and be able to meet its financial obligations. Thus, we predict a positive relationship concerning capital adequacy and profitability of banks. Due to economies of scale growing bank size is certainly related with the profitability of banks but for administrative complication, large banks might be incompetent and become unprofitable. So, for the mixed impact of bank size we cannot predict its' influence on profitability of banks. To judge the management competency to produce one unit of income by the one unit of expenses, we used Operating expense to total revenue ratio and expect negative relationship with banks' profitability. Poor management and lower cost efficiency induce high level of non-performing loan which eventually reduce bank profitability. We used NPL to total loan ratio to capture the management efficiency to keep the NPL at minimum level as well as maintain quality of assets. Negative association is expected between NPL and the profitability of the banks. We incorporated overhead cost to total asset ratio to realize the capability of the management to engender asset from incurring overhead cost. A negative relation of this ratio with the profitability has been expected. Total loan to total deposit ratio reflects asset-liability management of a bank. Lending is considered as asset and deposit is considered as liability for the bank. Banks usually offer more

loans to its customers, financed from deposits and other sources for increasing interest revenue. Even though there exists liquidity risk, higher of this ratio indicates that the bank is utilizing its fund to generate profit. Again, lower the ratio means that the bank has excess liquidity and the performance of asset-liability management is not satisfactory. In this context bank will bear liquidity burden as well as cost of fund which will reduce profitability. Considering the assumption of asset-liability mismanagement we expect adverse impact of this ratio on bank profitability.

We used the ratio of three largest banks' total assets over banking industry's total assets to measure the impact of industry concentration on bank profitability. Usually, this ratio is used as a proxy to measure competition in the industry. While concentration is high competition is low and vice versa. Due to higher concentration, banks are in a position to take the advantage of economies of scale in delivering banking services. At the same time encourages planning each other to earn more profit. Higher the market concentration, the higher their profit as a result of their collusive behavior Genchev (2012). According to the structure-conduct-performance (SCP) hypothesis, banks can earn monopoly profit when acting in a highly concentrated market as they are tending to collude Gilbert (1984). Also, there is a risk of "too big to fail" by expecting the reluctance of the regulatory body to let the bank fail due to insolvency. Again, excessive competition creates unstable banking environment while insufficient competition tempted inefficiencies and provide lower quality services. Such diverse influence was observed with this ratio on bank profitability from the study of different literatures (Yao et al., 2018; Islam & Nishiyama, 2016a). So, it's impact on profitability cannot be projected and to be answered from our empirical analysis.

Among macroeconomic variables, real GDP growth rate is used to measure the growth in economy. Sound GDP growth indicates that the economy is stable and people are reluctant to take loan from the bank. As a result, bank reduces its' business risk as well as profitability will be reduced. For this risk-return tradeoff we assume inverse relationship between GDP growth and bank profitability. Inflation reduces purchasing power of the money which creates demand for money. As a result, banks can increase their interest margin by adjusting their interest rate to recompense for the inflation premium (Al-Homaidi et al., 2018; Islam & Nishiyama, 2016b). In a study of 80 countries Kunt et al. (1999) observed a positive relationship between inflation and NIM. So, our hypothesis is, banks' profit is positively related with the inflation rate. The positive difference between interest charged against deposits and interest earned on its lending activities termed as interest rate spread which regulates banks' earning (Musah et al., 2018). Increased demand and providing better service for the accomplishment of loan triggered up interest rate for lending that ultimately increase bank spread. Therefore, we expect positive association between bank spread and profitability.

Data Sources and Variable Description

Bank level data have been obtained from the annual reports of different banks in Bangladesh. The data of macroeconomic variables i.e., real GDP growth rate, the rate of inflation and the term spread of interest rate have been obtained from Bangladesh Bank, the central bank of Bangladesh and Bangladesh Bureau of Statistics. We have evaluated the model using the STATA statistical software. Table 2 embodies the descriptive statistics of the regression variables used in our study.

Summary Statistics of dependent and independent variables of the commercial banks in Bangladesh for a period of 2007 to 2017 have been depicted in Table 2.

Table 2: Summary statistics of dependent and independent variables

Variables	No. of Observation	Mean	Std. Dev	Min	Max
Dependent Variable					
Return on Asset (ROA)	531	0.0091	0.0200	-0.1400	0.1260
Return on Equity (ROE)	534	0.2870	1.1200	-18.3000	7.5850
Net Interest Margin (NIM)	519	0.0711	0.4830	-0.0616	9.1980
Independent Variables					
Bank-Specific Variables					
i. Cost Efficiency (TE/TR)	524	0.8430	0.5440	0.0835	12.1900
ii. Liquidity position (LA/TA)	519	0.1720	0.1900	0.0013	3.0670
iii. Credit Risk (TL/TA)	517	0.6290	0.3380	0.0000	7.1790
iv. Capital Adequacy ratio (TE/TA)	483	0.1560	0.4250	0.0018	6.2670
v. Bank Size (In TA)	533	25.1700	1.1480	20.9300	27.8500
vi. Operating expense to total revenue ratio (OE/TR)	522	0.2920	0.5110	0.0398	11.4800
vii. Non-performing loan to total loan ratio (NPL/TL)	487	0.1060	0.1910	0.0000	1.2130
viii. Overhead cost to Total asset ratio (OH/TA)	519	0.0130	0.0452	-0.0072	1.0210
ix Total loan to total deposit ratio (TL/TD)	516	0.9860	2.1030	0.0207	43.5000
Industry- Specific Variables					
x. Concentration Ratio (CR3)	627	0.2640	0.0304	0.2340	0.3330
Macroeconomic variables					
xi. GDP growth rate (% of real GDP)	627	6.2890	0.5990	5.1000	7.2840
xii. Inflation rate (% Inf)	627	7.5280	1.5160	5.8300	10.6200
xiii. Bank Spread (SR)	513	5.0660	0.3210	4.4400	5.5100

From Table 2, we see that in Bangladesh the banks incurred average ROA of 0.94%, ROE of 28.7% and NIM of 7.1% from 2007 to 2017. The standard deviations for ROA, ROE and NIM are 0.0200, 1.120and 0.483 respectively, which shows sensible deviations in the profitability of Bangladeshi banks. It is apparent that greater sample size reduces the standard deviation because of the averaging out of deviations. This might be the cause of notable deviation in our study. Bank-specific factors have average values of 15.6%, 29.2%, 10.6%, 1.30% and 98.6% for the ratio of TE/TA, OE/TR, NPL/TL, OH/TA and TL/TD with standard deviation of 42.5%, 51.1%, 19.1%, 4.52% and 210.3% respectively.

From supply side macroeconomic framework, real GDP varies between 5.10 and 7.28 with an average value of 6.29. Likewise, the minimum value of inflation and bank spread are 5.83 and 4.44 where the maximum values are 10.62 and 5.51 respectively with a mean of 7.53 and 5.07 respectively. Regarding industry-specific variables, CR3 has an average value of 26.4% with a standard deviation of 3.04% (Min. = 23.4%, Max. = 33.3%).

In Table 3 the correlation matrix exhibits the degree of correlation among the dependent variable and independent variables considered in the regression analysis. The matrix represents a weak correlation among the independent variables. These pair wise correlation matrices are the STATA output and the abbreviated forms of Table 1.

Table 3: Pair wise correlation matrix

Variables	(ROA)	(ROE)	(NIM)	TE/TR	LA/TA	TL/TA	TE/TA	ln (TA)	OE/TR	NPL/TL	OH/TA	TL/TD	(CR3)	(% GDP)	(% Inf)	SR
ROA	1.000															
ROE	0.094***	1.000														
NIM	0.012	-0.008	1.000													
TE/TR	-0.166***	0.479***	-0.046	1.000												
LA/TA	0.005	0.072*	0.532***	-0.075*	1.000											
TL/TA	0.069	-0.032	-0.039	0.005	-0.152***	1.000										
TE/TA	-0.054	-0.091**	0.060	-0.067	0.527***	-0.106**	1.000									
ln (TA)	0.055	-0.011	-0.049	-0.054	0.467***	-0.047	0.696***	1.000								
OE/TR	-0.036	0.517***	0.014	0.939***	0.018	-0.024	0.041	0.032	1.000							
NPL/TL	-0.458***	-0.074*	-0.044	0.095**	-0.060	-0.083*	0.238***	0.061	0.056	1.000						
OH/TA	0.058	0.533***	0.012	0.915***	-0.013	0.010	-0.012	0.028	0.972***	-0.027	1.000					
TL/TD	0.232***	-0.006	-0.003	-0.063	-0.068	0.210***	0.049	0.154***	-0.027	-0.036	-0.013	1.000				
(CR3)	0.062	0.105**	0.040	0.039	-0.063	0.125***	-0.102**	0.251***	0.047	-0.066	0.079*	0.005	1.000			
(% GDP)	-0.074*	-0.087**	-0.103**	-0.016	-0.004	-0.080*	-0.020	-0.193***	-0.002	0.034	-0.025	-0.043	-0.424***	1.000		
(% Inf)	0.004	0.073*	-0.012	0.054	0.007	0.028	-0.005	0.103**	0.036	-0.021	0.084*	-0.015	0.283***	-0.173***	1.000	
SR	0.037	0.071	0.051	-0.012	0.019	0.065	0.057	0.158***	-0.139***	-0.020	0.049	0.016	0.521***	-0.623***	0.818***	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Table 4 depicts the Average value of ROE, ROA and NIM which are to be considered as profitability variables in our study.

Table 4: Year on year average ROE, ROA and NIM of banks in Bangladesh from 2007-2017

Year	Mean Return On Equity (ROE)	Mean Return On Asset (ROA)	Mean Net Interest Margin (NIM)
2007	-0.0664	0.0079	0.0422
2008	0.4416	0.0111	0.0362
2009	0.6180	0.0114	0.1832
2010	0.5259	0.0166	0.2605
2011	0.3765	0.0114	0.0638
2012	0.1686	0.0052	0.0370
2013	0.1759	0.0047	0.0764
2014	0.2059	0.0074	0.0231
2015	0.3287	0.0101	0.0234
2016	0.1807	0.0074	0.0402
2017	0.2622	0.0082	0.0284

From Figure 1, we observe that within the study period (2007-2017), ROE was highly deviated from the mean in 2007 and 2009, ROA was steadily deviated from the mean throughout the period, and significant deviation of NIM was found in 2010. The three profitability indicators give different degree of extent from the mean during the time span of the study.

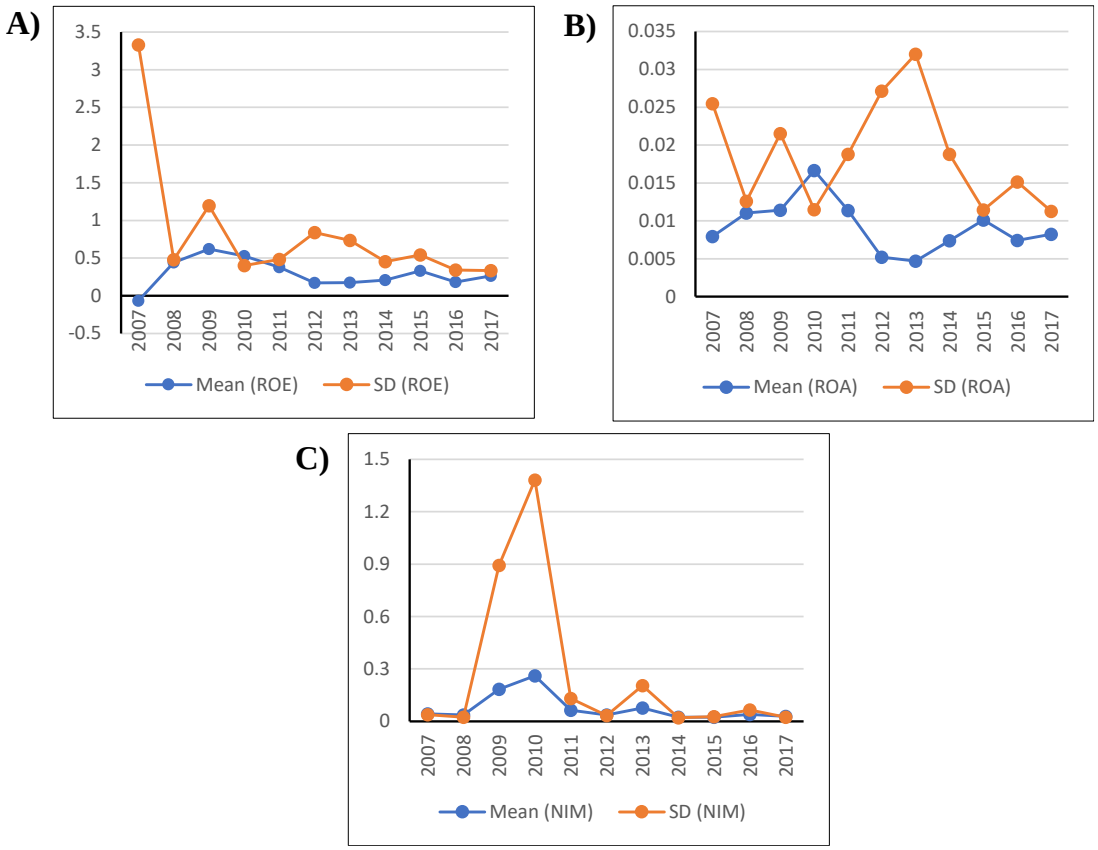

Figure 1: Trend of average and standard deviation of A) ROE, B) ROA and C) NIM of commercial banks in Bangladesh from 2007 to 2017

Diagnostic test

Table 5: Test of multicollinearity

Variables	VIF	1/VIF
i. Cost Efficiency (TE/TR)	1.93	0.5174
ii. Liquidity position (LA/TA)	1.27	0.7898
iii. Credit Risk (TL/TA)	1.15	0.8680
iv. Capital Adequacy ratio (TE/TA)	2.51	0.3980
v. Bank Size (In TA)	2.73	0.3658
vi. Operating expense to total revenue ratio (OE/TR)	2.46	0.4058
vii. Non-performing loan to total loan ratio (NPL/TL)	1.28	0.7807
viii. Overhead cost to Total asset ratio (OH/TA)	1.57	0.6376
ix. Total loan to total deposit ratio (TL/TD)	1.18	0.8488
Mean VIF	1.79	

In Table 5, VIF test has been furnished to determine multicollinearity problem among explanatory variables of our study. The outcome of test indicates that VIF for every independent variable is less than 10 (cut off value of VIF) and the average is below 2. Acceptable value of each variable is less than 10. Thus, the model of the study is away from the multicollinearity problem.

Empirical Result

Hausman test confirms the reason of employing fixed effect estimator. In this model we use Driscoll and Kraay (1998) standard error which suggested a non-parametric covariance matrix estimator that constructs heteroskedasticity and autocorrelation consistent standard error (Driscoll and Kraay standard errors) that are strong to general forms of spatial and temporal dependence. Specially Driscoll-Kraay standard errors are well adjusted when the regression residuals are cross-sectionally dependent.

Table 6: Result outcome of the fixed-effect model for the determinants of bank profitability in Bangladesh from 2007 to 2017

Explanatory variables	ROA	ROE	NIM
Constant	0.4030***	2.7450	0.7280*
	(0.0636)	(3.4050)	(0.3560)
Bank-Specific Variables			
Cost Efficiency (TE/TR)	-0.0258***	0.4720	-0.0635***
	(0.0055)	(0.3620)	(0.0070)
Liquidity position (LA/TA)	-0.0109***	-0.1780	0.0195
	(0.0018)	(0.1410)	(0.0227)
Credit Risk (TL/TA)	0.0001	0.0736***	0.0055
	(0.0004)	(0.0142)	(0.00439)
Capital Adequacy ratio (TE/TA)	-0.000618	-0.184*	0.00171
	(0.000587)	(0.0990)	(0.00466)
Bank Size (In TA)	-0.0146***	-0.136+	-0.0358***
	(0.00109)	(0.0701)	(0.00916)
Operating expense to total revenue ratio (OE/TR)	0.0340**	-0.635	-0.00832
	(0.0114)	(0.658)	(0.0975)
Non-performing loan to total loan ratio (NPL/TL)	-0.00250	0.0755**	0.00658+
	(0.00370)	(0.0264)	(0.00354)
Overhead cost to Total asset ratio (OH/TA)	0.0353	-11.10	-0.109
	(0.185)	(9.802)	(1.114)
Total loan to total deposit ratio (TL/TD)	0.000401***	-0.00668*	-0.00132+
	(0.0000872)	(0.00323)	(0.000775)
Industry-Specific Variables			
Concentration Ratio	-0.187*	14.06*	0.0551
	(0.0775)	(5.476)	(0.359)
Macroeconomic variables			
GDP growth rate (% of real GDP)	0.00169	-0.0223	0.0241**
	(0.00277)	(0.0923)	(0.00779)
Inflation rate (% Inf)	-0.00233+	0.0570***	-0.00726*
	(0.00130)	(0.0129)	(0.00297)
Bank Spread (SR)	0.00856	-0.565***	0.0301**
	(0.00780)	(0.0718)	(0.00944)
No. of observations	383	383	383
Within R- Square	0.2452	0.1166	0.1843
F- Statistics	(0.0000)	(0.0000)	(0.0000)

Note: This table reveals the regression output from the fixed effect evaluation of the determining factors of ROA. ROE and NIM Coefficients which are considerably diverse from zero at the 1%, 5% and 10% level are indicated with ***, **, * respectively and Drisc/Kraay Standard errors in the parentheses.

Table 6 presents the regression output of the empirical model of our study in equation-1 consistent with the fixed effect model estimator of the profitability determinants of ROA, ROE and NIM of the commercial banks in Bangladesh. Among bank-specific managerial variables, cost-efficiency is highly significant and negatively correlated with profitability at the 1% significant level while profitability is measured by NIM and ROA which is supported with the findings of the study of UK banks by Kosmidou et al. (2005). This negative correlation suggested that a rise in total expense in relation to total revenue would decrease bank profitability. This finding is also similar to the determinants of bank profitability and the relevance of expense preference behavior theories of Edwards (1977). In a study, Edwards and Heggestad (1973) showed that efficient expense management to be the most important determinant of bank profitability. Skillful management of expenses will enhance profitability of the banks.

Liquidity position of the bank, measured with the ratio of liquid asset to total asset has a strong significant negative impact on profitability while measured in terms of ROA. This finding is confirmed our expectation and in line with the tradeoff theory of profitability and liquidity. If the bank does not maintain adequate amount of liquidity, it become illiquid for which the bank may lost its goodwill and lucrative investment opportunity which eventually turn into a risky position. Again, huge amount of investment in current asset will reduce profitability as idle money will not generate anything. This finding is similar to the study with Molyneue and Thorton (1992). Credit risk has significant positive association with ROE and also positive with ROA and NIM which is similar with the study of Boahene, Dasah and Agyei (2012) and Saaed and Zahid (2016). It indicates that, banks can charge more interest to make up the risk of default which intern induce more profit. By giving loan banks can increase its earning through charging fees, commission etc. Again, we also experienced, core banking operation is profitable for banks putting the NPL in one side. This outcome is similar with Dietrich and Wanzenried (2011).

Capital adequacy is negatively correlated with ROA and ROE This result outcome is similar to the study of Goddard et al. (2004) and Angbazo (1997). They argued that the relationship between capital adequacy and bank profitability should be negative as overcapitalization of a bank indicates unused investment opportunity. In a study of the impact of capital on the performance of commercial bank, Berger (1995) observed similar result and argued that reduction of external borrowing increases bank performance. He also stated that in the conventional risk return hypothesis, risky position with lower capital can generate sophisticated profits. As a safety measurement, banks may set aside a portion of its earning as buffer which may affect profitability. Despite of taking various efforts by the regulators in time to time, the capital base is not supported to achieve the objective of accelerating profitability. Rather protecting depositors maintain stability and emphasize on increasing confidence in banking industry Barnor and Odonkor (2013) and Blum (1999). We also observed that capital adequacy is positively correlated with NIM but not statistically significant. It means that bank with adequate level of capital can cope up any potential shocks and develop financial strength.

Bank size has a strong significant negative association with all the determinant of bank profitability. It suggests the absence of economies of scale in the Bangladeshi banking sector and hold the proposition of “too big to fail”. Increase in size also require some overhead and administrative costs which will reduce bank profitability.

Operating expense to total revenue has a statistically significant positive affiliation with ROA. It implies that bank will enhance its’ profitability through attracting its customers by rendering better services and using improved technologies. At the same time a rise in operating expenses leads to increase lending rate which will negatively affects NIM and ROE.

In our study non-performing loan ratio has positive significant relationship with ROE and NIM in line with the study of Gabriel (2006) and Sufian (2012). During economic uptrend, risky borrowers take more loan and increase interest income. High level of NPL can be leveled for high interest spread which we have experienced in our study as we found the significant relationship of bank spread with ROE and corroborate with the study of Were and Wambua (2014). In a booming economy, customers are able to generate more earning through investment by borrowing. This will support the investor to honor debt and hence lowering NPL.

Total loan to total deposit ratio significantly and positively affects the profitability of banks while measured by ROA and negative with ROE and NIM in Bangladesh. It shows the capability of the bank to cover loan losses and withdrawals of its customers. Bank profit is mainly generated from stimulating interest against deposits which means profit is equipped through the positive difference between interest of loans and interest on deposits. Banks mobilize its fund from the deposits and offer various kinds of deposit schemes to its clients and financial institutions which have a link with the profitability of the banks (Rasiah & Tan, 2010).

Concentration in the banking sector in Bangladesh has significant impact on profitability. It affects positively on ROE and NIM but negatively on ROA, indicating the structure-conduct-performance hypothesis which states that market structure influences the competitive behavior which further affects bank profitability. Banks in highly concentrated markets behave less competitively and capture more profit Bain (1951). The negative relationship with ROA indicates, due to monopolistic position highly concentrated banks contribute lower profitability. Thus, Bangladeshi bank can exercise their market power to charge higher interest rates on credits and pay lower interest rates on deposits. The similar result is achieved in Athanasoglou et al. (2006).

Among the macro-economic variables, we observed significantly positive correlation of GDP growth rate with ROA and NIM. It is similar with the results of Bourke (1989), Molyneux and Thornton (1992), Demirguc-Kunt and Huizinga (1999), and Athanasoglou et al. (2006) where they found a positive correlation between GDP growth with bank profitability. Due to favorable economic condition, economic activities are growing, household savings are increasing and demand for enterprise financing leads to increase the growth rate of GDP. Therefore, the growth of economic activities upsurges the demand for banking services which contributes bank profitability reflected with the positive association with NIM. We observed positive coefficient of bank spread with ROA and NIM the explanation is that confidence in economy may grow which might encourage businesses to raise their bank borrowings. As a result, banks may have the opportunity to gain more from its lending activities (Kosmidou et al., 2005). But this variable has significant negative impact on ROE which means that asset sensitive banks are negatively influenced by the increase in spread and vice versa. This impact is in line with the impact of non-performing loan which will grasp the benefit of interest rate spread. This entails bankers to put emphasis on their asset and liability management to defend themselves from the adverse deviations in interest rates.

Inflation is negatively related to ROA and NIM but positive significant relation with ROE. This advocates that commercial banks in Bangladesh are not able to adjust the lending rates to reflect the rise in overall price level quickly and appropriately. Consequently, they endure portion of the cost of inflation on their profits. Again, significant positive effect of GDP and bank spread and negative impact of inflation on NIM indicate the pro-cyclicality of bank profitability in Bangladesh.

Conclusions

This study provides comprehensive new insights of different banks' specific managerial and internal issues that are accountable to enhance profitability of banks in Bangladesh. In terms of both the significance of the explanatory variables and the directional relationship with response variable go with the other studies with a little addition. We observed that the effect of the variables is diverse with the different proxies of profitability. Research outcome established that the factors of our study are relevant. This study inferred that some of the bank-specific factors possess some substantial effects on bank profitability in Bangladesh. Our empirical result shows that cost efficiency has significant impact on the measures of profitability. Cost efficiency can be improved by dropping undesirable working expenses. Similarly, overhead cost negatively influences ROE and NIM but the impact is insignificant. Equity holders of the banks should have considerable attention in this regard for maximizing its wealth. Furthermore, total loan to deposit ratio is positively and significantly associated with ROA and overhead expenses is also positively related with ROA. It suggests that efficient fund management including investment and assessed expenditure should be given a specific care by the bank. Capital adequacy of bank is supposed to be preserved as it is or over and above. From the study it is detected that well capitalized banks can generate sophisticated profits by publicizing the reduction of profit in credit risk. Furthermore, we observed an evidence of negative significant correlation concerning liquidity and profitability while measured in terms of ROE but not significant with ROA and NIM. Bank size has negative and significant effect on all the profitability indicators, indicating that growth in bank size is meaningless regarding profitability. Rather efficient cost management, maintaining adequate liquidity and providing more loans can significantly enhance profitability of banks in Bangladesh.

Among the three macroeconomic variables, inflation perceived negative consequence on profitability, while real GDP growth rate significantly influences NIM and bank spread has insignificant relationship with the profitability of Banks in Bangladesh.

The future researchers may perform comparative study in different dimensions likely, comparison between private banks and state-owned banks, comparison between traditional banks and Islamic banks etc. Further research can be carried out including other explanatory variables such as, corporate governance, corporate social responsibility (CSR), corporate tax rate, and deposit insurance to accelerate the model. Structural

equation modeling, mediation effect modeling can be used to construct econometric model. Extended time adjustment analysis is desirable in the variables to magnify the profitability of banks in Bangladesh. At the end, the outcomes of the study are very much policy relevant and an important contribution to the existing literature.

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